Forecasting the European wind drought of winter 2016/17

Case study

Climate Change

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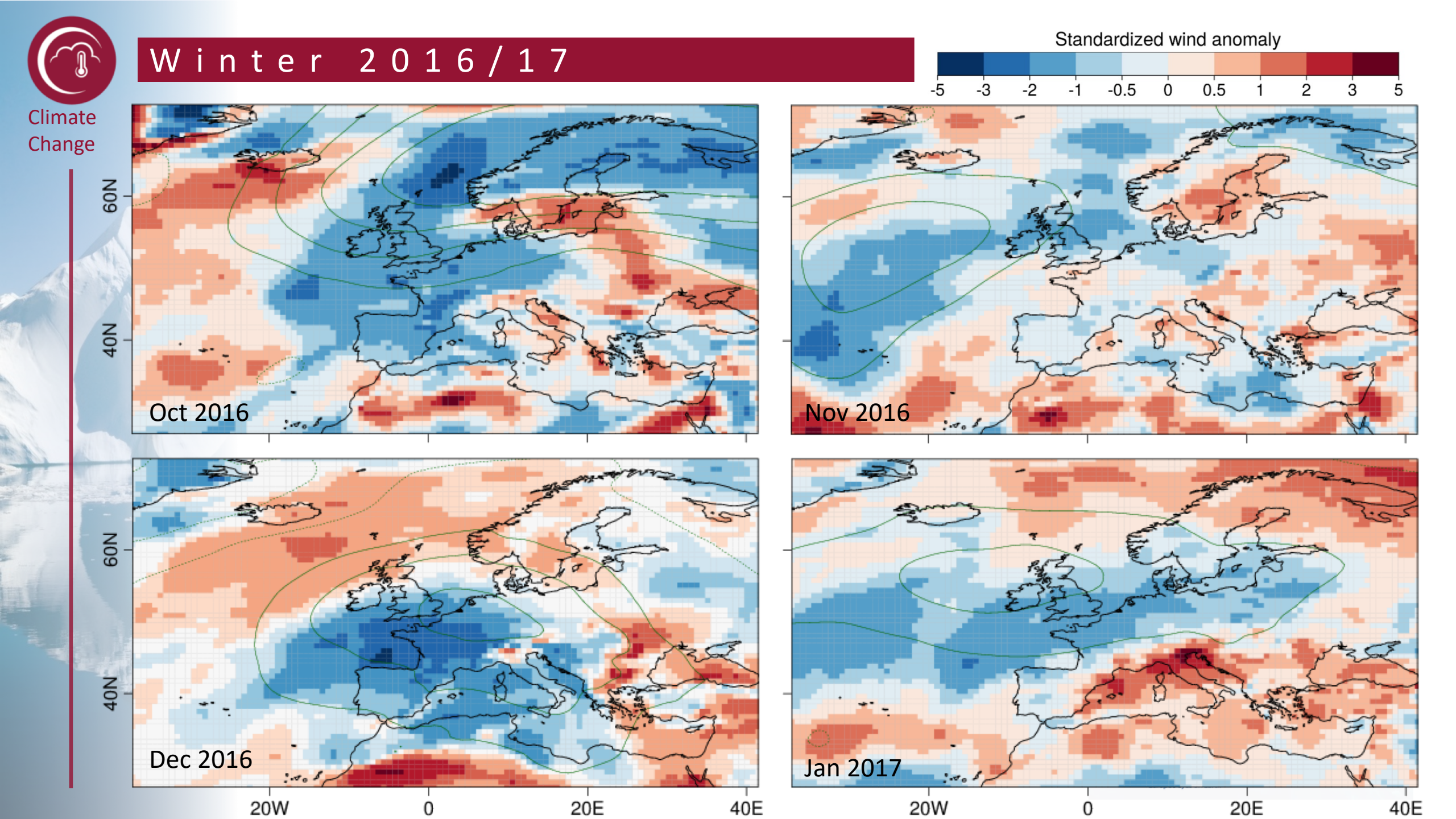
Winter 2016/17



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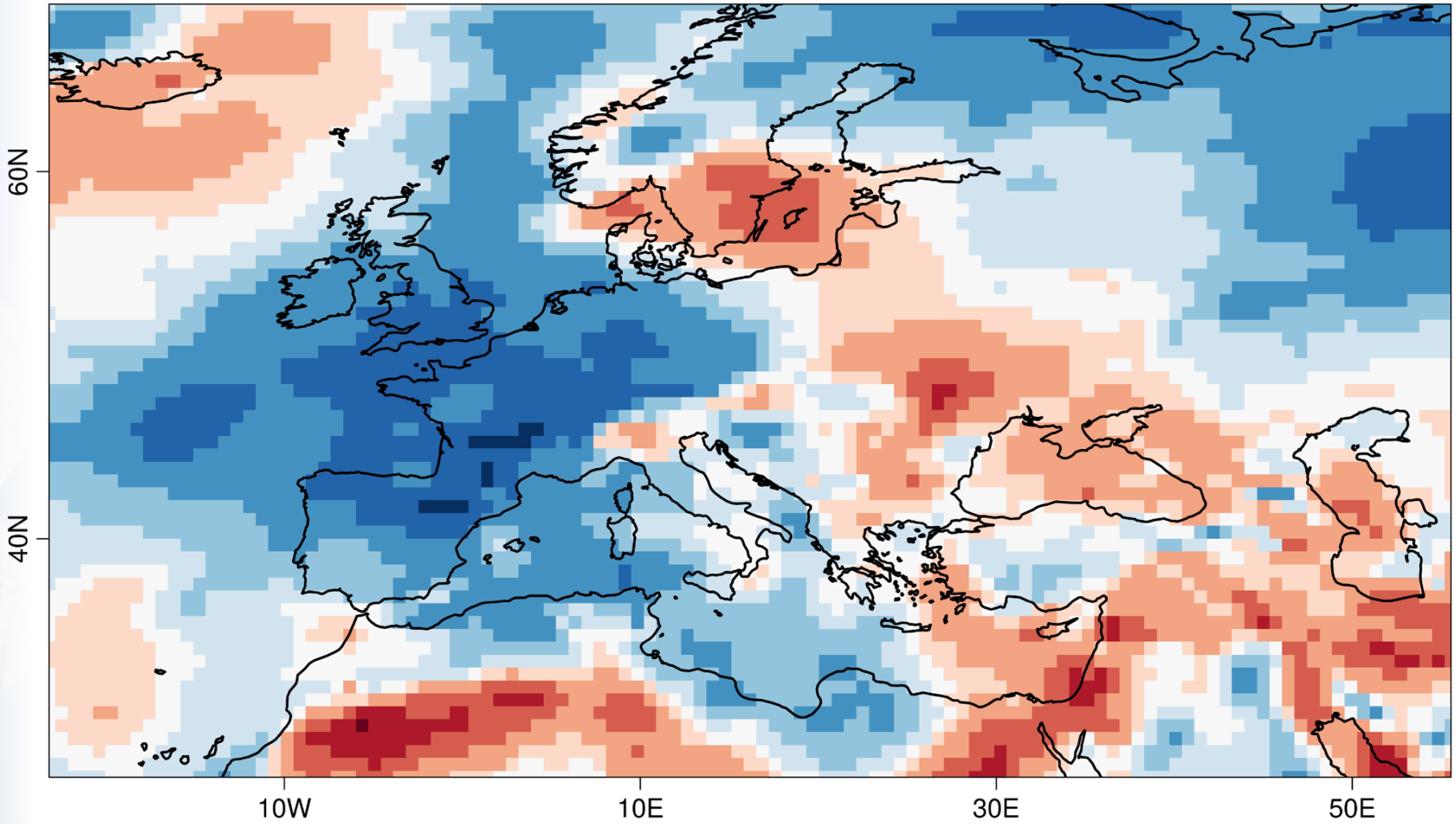
2016-Q4 anomaly



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Event impacts

Lack of wind power production

Mince precipitations and less water for hydropower

Cold temperatures increase electricity demand

Power prices rise (coincidental with nuclear stop in France)

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W h y ?

Fast evolution

Slow evolution

Bad luck

A slow component is forcing the atmosphere

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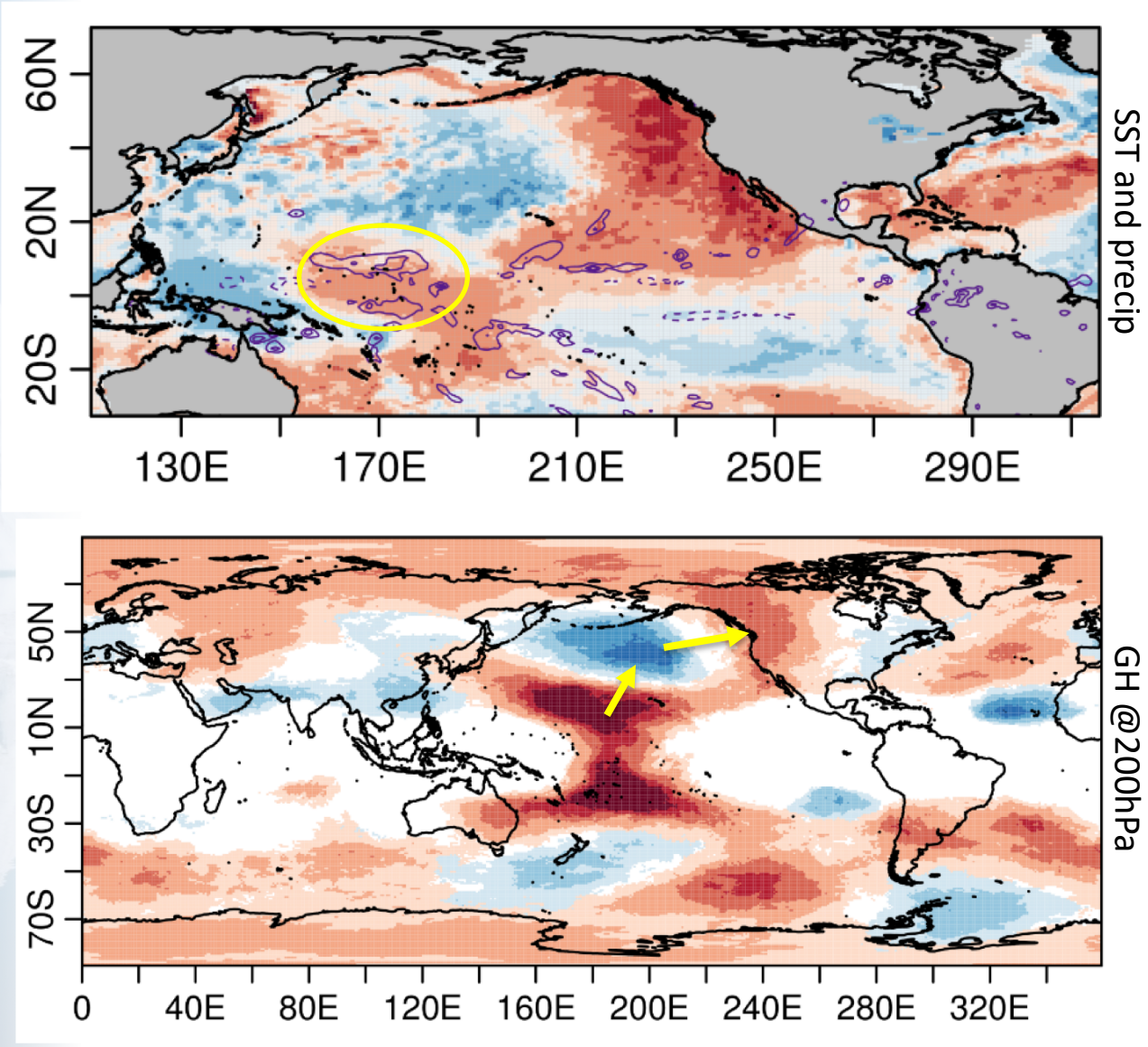
A practical example: US drought Q1-2015

January-March 2015



(images for March 2015)

High SSTs in western tropical pacific

↓

Enhanced convection in the area

↓

Upward flow produces divergence at 200hPa

↓

Rossby wave propagates to North America

↓

Results in persistent low winds

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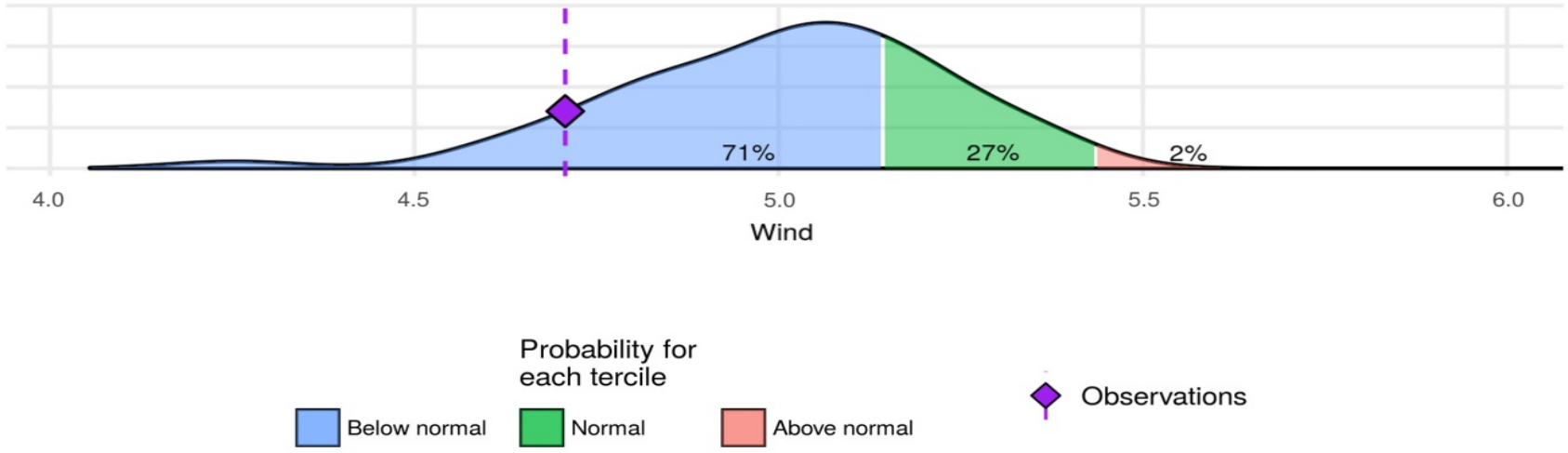
How to forecast wind averages?

- Use a coupled Earth System Model:
  - Forecast slow evolution fields + impact on fast evolution
  - Several ensemble members to get rid of uncertainty
- Bias adjust/calibrate ensemble members
- Average whole season to filter out noise and get signal
- Distribute the ensemble members into 3 categories
- Compute probabilities



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DJF 2016/17 forecasts

www.bsc.es/ess/resilience

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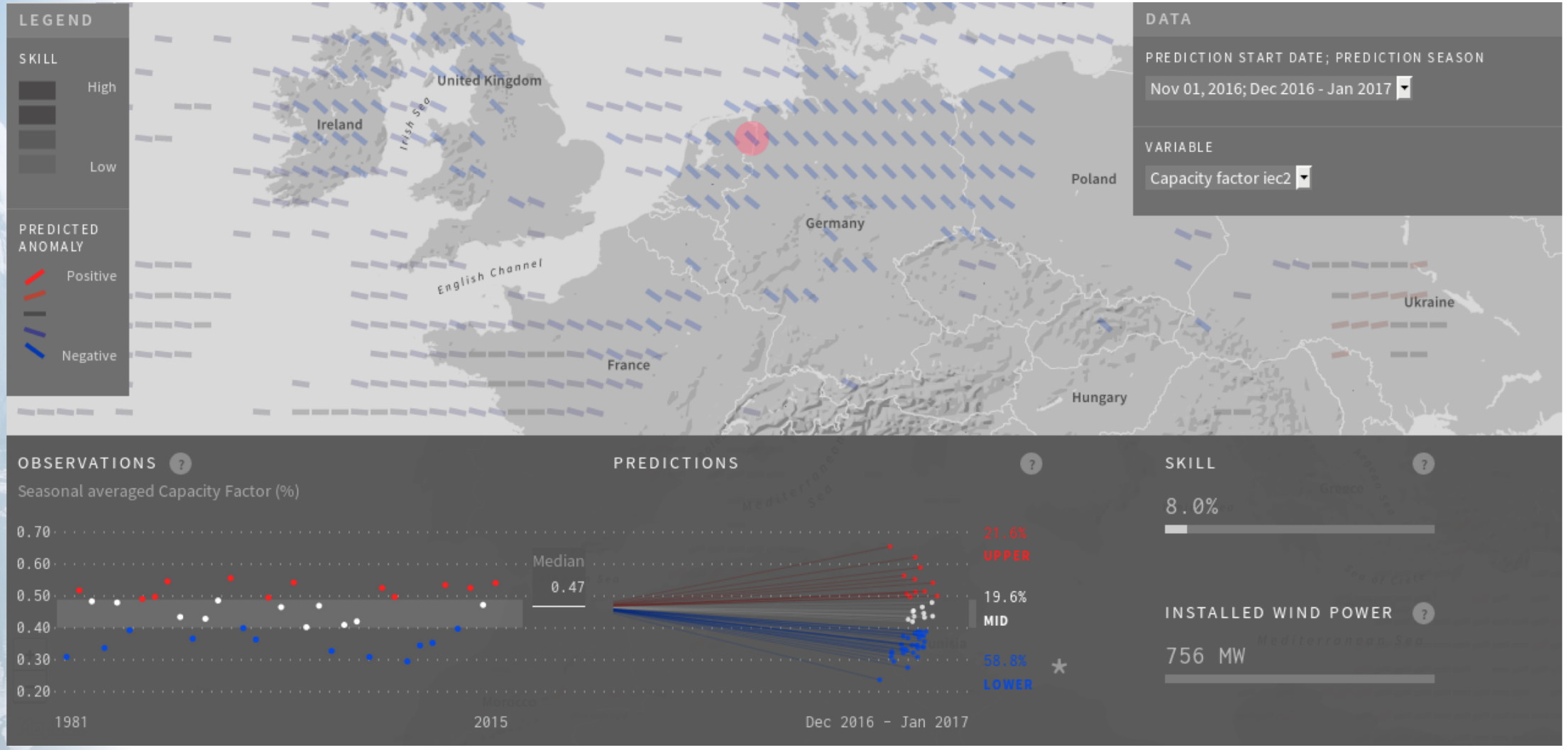
Point forecasts



www.bsc.es/ess/resilience

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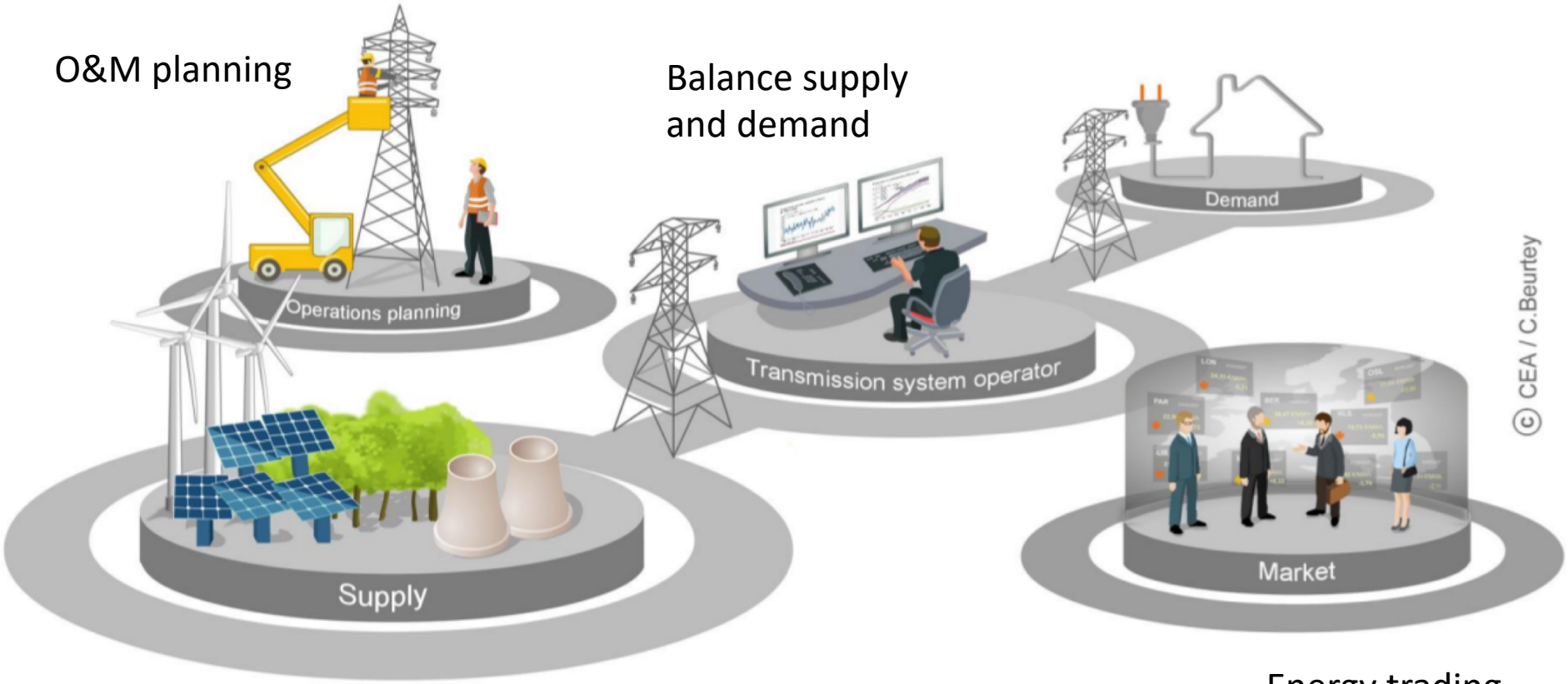
Potential applications

O&M planning

Balance supply and demand



Cash flow anticipation

Energy trading

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Stay tuned

Find the case study report at C4E website:
http://clim4energy.climate.copernicus.eu/wind-power

Check the 2016/17 DJF forecasts at:

- www.bsc.es/ess/resilience
- http://c4e-visu.ipsl.upmc.fr/

Further investigation of the case under:

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Capacity factors

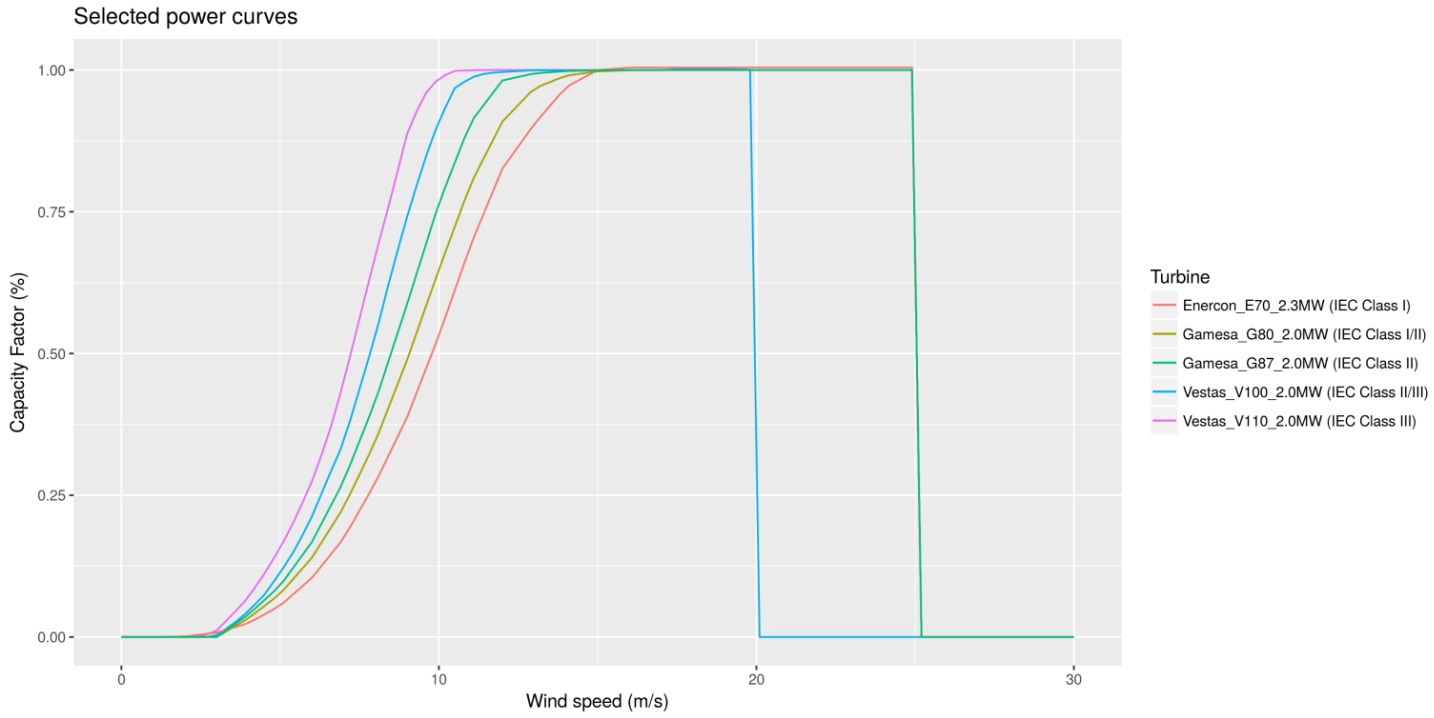
Capacity factor is a good indicator of wind power generation.

Is independent of:

- number of installed turbines
- nameplate capacity of installed turbines

Using manufacturer power curves for three turbines representing IEC classes.

Fed with: 6-hourly model data, sheared at 100m.



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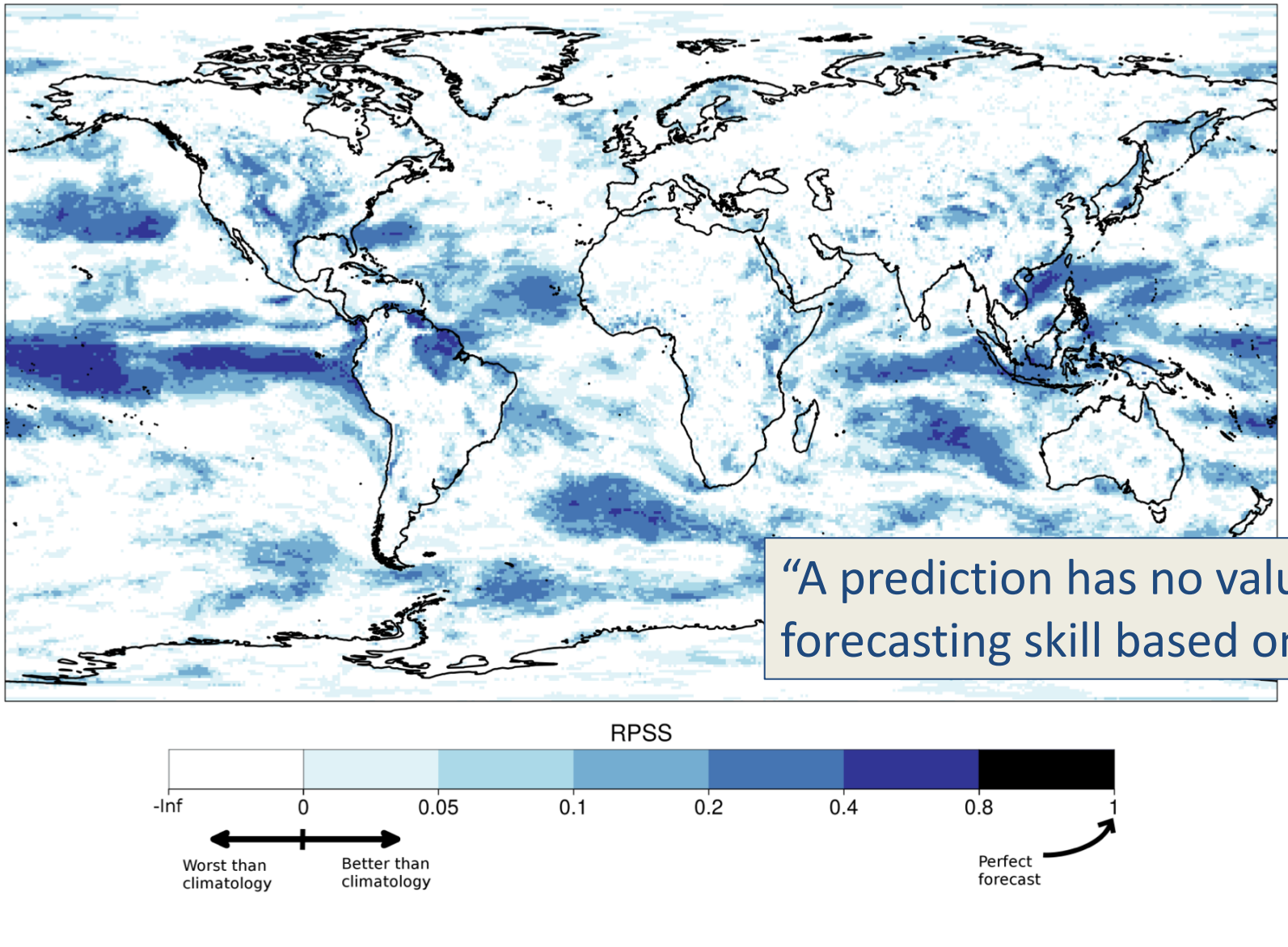
SKILL ASSESSMENT



Skill assessment for DJF (1981-2013)

Displaying: Ranked Probability Skill Score [RPSS]

"A prediction has no value without an estimate of forecasting skill based on past performance"

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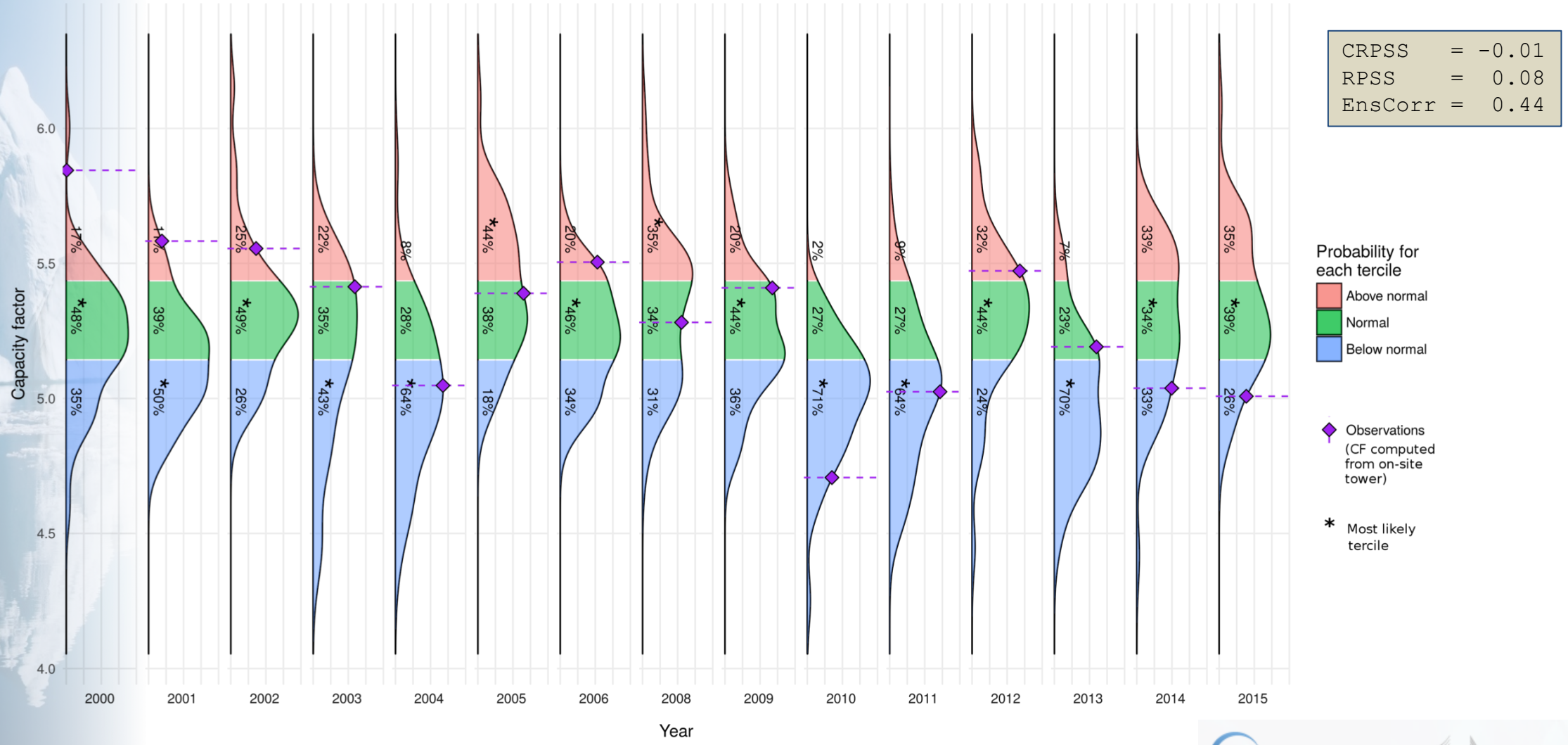
SITE SPECIFIC FORECASTS

Retrospective forecasts for JJA at Site1 (2000-2015)



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